The
Florida Entomologist
Official Organ of the Florida Entomological Society

VOL. VI AUTUMN NUMBER No. 2
SEPTEMBER, 1922

22 NOV. 1922
ENTOM.

NEW SPECIES OF CICADELLIDAE FROM THE SOUTHERN U. S. (Homoptera)

HERBERT OSBORN

Deltocephalus limicolus, n. sp.

Dark gray with fuscous markings; numerous reticulate lines and cross nervures on the eytra. Length, female 3.75 mm; male 3.6 mm.

Head wider than pronotum; vertex wider than long, one-half longer at middle than next the eye, obtusely angulate; margin subangulate to front; front broad, lateral borders curved; clypeus with sides nearly parallel; cheeks broad and deeply sinuate. Pronotum as long as vertex, truncate behind; scutellum small; elytral venation irregular, the clavus with numerous irregular reticulations, and the anteapical cells broken by irregular cross veinlets.

Color: Gray; vertex ivory whitish with four dots on the anterior border, two lunate spots midway and two rounded ocellate spots on the hind border, fuscous. Pronotum fuscous with five gray stripes, the inner three connected by cross-band near the front; scutellum with ivory spots each side; elytral veins and veinlets mostly ivory white, the areoles mostly fuscous, the first apical areole densely black, the others with whitish centers bordered with smoky; front pale fuscous with transverse whitish arcs and a central whitish line; clypeus dull white with smoky borders; lorae light yellow, with dusky margin; cheeks dull gray, legs fuscous, banded and striped with dull white; abdomen beneath blackish, the borders of segments and the outer part of pygofer lighter.

Genitalia: Female, last ventral segment short; hind border truncate or slightly concave; pale whitish, bordered with fuscous; side plates conspicuous. Male, valve short, transverse, broadly rounded behind; plates broad at base, narrowing rapidly, terminating in acute thin slightly upturned tips not attaining the tip of the pygofer.

Numerous specimens were collected at St. Petersburg, Fla., February and March, 1921, on a creeping succulent plant growing in a tidal flat and associated with fiddler crabs and snails. Type and paratypes in author's collection. Superficially this species bears some resemblance to *arundineus*, but the details of the color pattern are different, the body is more robust, and there are distinct differences in the genitalia.

Deltocephalus fusconotatus, n. sp.

Ivory whitish with numerous fuscous spots on pronotum, scutellum and base of elytra. Length, male 3.5 mm.

Head slightly wider than pronotum; vertex as long as width between the eyes, one-half longer at middle than at eye, margin acute toward the apex; front narrow, tapering gradually to base of clypeus; clypeus long, nearly twice as long as wide, sides nearly parallel; lorae short, distant from border of cheek; cheeks broad, distinctly sinuate beneath the eye. Pronotum as long as vertex; scutellum acuminate at tip; claval veins merging near base, middle anteapical cell divided by merging of veins.

Color: Light gray or ivory white; vertex bordered anteriorly with black, except at extreme tip; the outer part of the black line enclosing the ocellus. Pronotum with three somewhat diffuse spots, scutellum with two dots on the base, elytra with a basal dot and a dot before and back of the merged veins, a costal spot near the base, another before the nodal vein and the apical cells, fuscous or blackish; face with base of front densely black, the remainder of front with clypeus, lorae and lower part of cheek, white; a large squarish spot below the eye, reaching antennal pit, black; thorax and abdomen white with a black dot on the pleural pieces, a black band at apex of femora, and black dots on the hind tibiae, and black rings on the hind tarsi.

Genitalia: Male, valve narrow, rounded behind; plates small triangular, about one-half the length of pygofer.

Described from a single specimen, collected at "Cameron, La., Aug. 14-28, 1903", by Prof. J. S. Hine.

This is a handsome little species, somewhat resembling *arundineus*, but differing so much in the color pattern, especially on the face, that it seems impossible to refer it to that species. There is also a distinct difference in the male genitalia.

Lonatura notata, n. sp.

Pale straw color, with numerous black dots on pronotum, elytra and abdomen. Length, female 4 mm; male 3.5 to 3.75 mm.

Head slightly wider than pronotum, distinctly produced, subconical; vertex somewhat flattened, but convex, as long as width between the eyes, nearly twice longer at the middle than next the eye; front narrowing rather abruptly to clypeus; clypeus broad, about one-half longer than width at base, scarcely widened at the middle; lorae elongate, the tips distant from border of the cheek; cheeks narrow, the margin sinuate beneath the eye. Pronotum about three-fourths as long as vertex, hind border slightly concave; scutellum small, short; elytra scarcely reaching base of abdomen, hind border truncate, leaving entire upper surface of abdomen exposed.

Color: Light straw; vertex with three pairs of faintly fuscous spots; two dots on the anterior border, a larger spot at the lateral border, two dots at base of scutellum, a large dot on clavus, a similar one at middle of hind border of elytra, and eight series of dots on the abdominal segments, a dot on anterior femora, a line on the hind femora, dots on the hind tibiae and tarsal claws dark fuscous or black.

Genitalia: Female, last ventral segment short, concave behind, with a central broad tooth notched at the apex; ovipositor scarcely exceeding the pygofer. Male, valve short, rounded behind; plates small, triangular, acute at tip, reaching half way to end of pygofer.

Described from specimens collected at St. Petersburg, Fla., March 5, 1921. Type and paratypes in author's collection. I have also taken speci-

mens at Ocean Springs and Pascagoula, Mississippi, during February, 1921.

The species occurs in the flat-woods association on native grass, and is probably a grass feeder. Numerous black dots on the upper surface seem to be a distinctive character. Only short-winged forms have been noted, so that the venation of long-winged forms, if they occur, has not been seen.

Euscelis (Athysanus) **fumidus** n. sp.

Somewhat like *magnus* but much darker, smoky black, the entire surface appearing suffused with a deep brown-black color. Length, male 6.25 mm.

Head wider than pronotum, vertex short, scarcely longer on middle than next the eye, very obtusely rounded to front, front broad, subangulate at antennae, narrowed abruptly to clypeus; clypeus nearly twice as long as wide, cheek broadly rounded below the eye. Pronotum distinctly transversely striate. Posterior border shallowly concave.

Color: Dark fuscous with small obscure yellowish irrorations; vertex lighter, yellowish with fuscous irrorations; front lighter above, darker below with obscure pale arcs; clypeus nearly black; lorae and cheeks blackish smoky, the whole irrorate with minute yellowish dots. Pronotum scutellum and elytra blackish with minute yellowish dots. Legs blackish with spines somewhat lighter, venter blackish with a central row of light dots.

Genitalia: Male valve small, short, obtusely angulate behind; plates small elongate triangular, tips acute, black, with a row of lighter bristles on the margin.

One specimen, male (type) of this peculiar species from Chester, Ga. This has the appearance of a *Phlepsius* and might be considered as related to *P. latifrons* but it is evidently congeneric with *magnus*. It is distinctly different from this species in the absence of the white band on the pronotum and the white costa, as well as in the intense pitchy black color. If an extreme form of *magnus* it will have to be recognized as a distinct variety.

Euscelis (Athysanus) **drakei**, n. sp.

Related to *magnus* and *fumidus* with a yellowish band behind the middle of pronotum and four milky spots on elytra. Length 6.25 mm, 6 mm.

Head wider than pronotum. Vertex very short, margins parallel; disc convex rounded to the front; front convex except slight depression at base, front about as broad as long, suture below ocellus distant from eye, obtusely angled at eye; clypeus tip scarcely wider than base; lorae rather broad, not reaching margin of cheek; cheek broad, sinuate below eye; pronotum broad; anterior margin broadly arcuate, hind margin slightly concave, lateral margin flaring and sharply carinate. Elytra densely reticulate, somewhat rugose, scarcely exceeding tip of abdomen.

Color: Smoky brown to fuscous. Vertex tawny with minute fulvous dots; upper portion of face like vertex; front below minutely dotted with tawny; arcs faintly indicated; cheeks darker on the margins. Pronotum dark brown to fuscous; posterior border somewhat darker, with a broad yellowish band behind the middle, the whole minutely sprinkled with tawny dots. Scutellum tawny with yellow dots. Elytra smoky, minutely dotted with fuscous; two white patches on the middle of clavus and two on the inner anteapical cell, the anterior just below claval spot.

Genitalia: Female, last ventral segment scarcely longer than penultimate; posterior border sinuous, the middle third and lateral lobes produced; minutely notched on middlle, lateral lobes rounded.

Described from two spemines, females, (type and paratype) collected at Gainesville, Fla., by C. J. Drake. Type in Osborn collection, Ohio State University.

This species is very close to *magnus* O. & B. but aside from the conspicuous transverse spots on the elytra, the costa is not white and the female segment differs in form.

Euscelis (Athysanus) magnus var piceus, n. var.

Similar to *magnus* of typical form but with the coloration, except for the white band on the pronotum and the costal border, of a deep pitchy black and the female sgment with median notch much smaller. Collected by Mr. H. L. Dozier at Pascagoula, Miss., Aug. 8, 1921.

Mesamia nervosus, n. sp.

Light yellow; vertex with an interrupted submarginal black border; elytra with fuscous veins; five or more conspicuous cross veinlets in the outer costal area. Length, female 4 mm.; male 3.5 mm.

Head slightly wider than pronotum; vertex nearly twice as wide as long, rounded in front, about one-fourth longer at middle than next the eye, distinctly angular to front; front narrowing nearly uniformly to base of clypeus; clypeus narrow, nearly twice as wide as long, slightly widened toward the tip; lorae rather narrow, with tip nearly reaching to the margin of the cheek; cheek slightly sinuate below the eye. Pronotum two-thirds longer than vertex, slightly concave behind; elytra with cross veinlets in outer claval and costal cells; two cross veins.

Color: Vertex, pronotum and scutellum yellow tinged with green, vertex with a conspicuous submarginal band interrupted at the middle behind which is a fainter fuscous band in the female, scarcely apparent in the male; disc of pronotum darker; elytra hyaline, the veins conspicuously dark fuscous or black, the cross veinlets of costa widening on the margin; apical broadly blackish; beneath, face yellowish-green, a narrow black line bordering the base of front; abdomen greenish, the segments above with black spots or bands.

Genitalia: Female, last ventral segment about twice as long as preceding; apex broadly rounded with a faint notch at middle; male, valve short, rounded behind; plates triangular with acute upturned tips; the disc marked with a distinct impression paralleling the outer border.

Described from a female, (type) Sept. 27, 1921; and male, (allotype) Sept. 9, 1921, collected by Mr. F. E. Guyton, Auburn, Alabama.

Also one female, (paratype), from Keatchie, La., June 14, 1905. This latter differs from the type in having a less distinct second band on the vertex, a more distinct yellow color to the pronotum, but otherwise is so similar that it seems impossible to consider it a distinct species.

These specimens approach most nearly to *Mesamia stramineus*, Osb., but have a different shaped vertex and much more distinct venation.

ADDITIONS TO THE THYSANOPTERA OF FLORIDA. X

J. R. WATSON

54. Megalomerothrips eupatorii Watson.

Male. The female only of this species was originally described. (Fla. Buggist, Vol. II, No. 3, Feb. 1919). We now have the male also. Much darker in color than the female, almost jet black. Fore tarsus with a very large, slightly curved spine, 27 interlocated bristles on the fore wing. Taken from the burrow of a cerambycid in a dead twig of avocado, Winter Haven, Oct., 1921. An additional female was collected by Dr. E. W. Berger in one of his colonies of cottony cushion scale. It may be predaceous.

57. Dictyothrips floridensis Watson.

Male. Considerably lighter in color than the female. Light brown with traces of bright red hypodermal pigment. Abdomen very slender, darker than the thorax. In the integument on the dorsal side of segments 2-7 are numerous large pellucid dots which occupy about ¼ the surface. These peculiar dots seem to be entirely absent from the females.

Larvae light yellowish brown with much red hypodermal pigment.

Described from several males and larvae.

In addition to the type locality in the Plant Introduction garden at Miami, this species has been collected in the Plant Introduction Garden at Brooksville by W. B. Wood and H. L. Sanford of the U. S. Horticultural Board. In addition to the original host, Guava, it was taken on *Passiflora sp., Rubus sp., Arracacia xanthorihisa,* and *Prunus sp.* Since it has been found only in the Plant Introduction gardens and its nearest relative is a native of Mexico, it would seem quite probable that this is an introduced species.

74. Heliothrips phaseoli Hood.

Abundant on Kudzu on the Station grounds, Gainesville, June, 1921.

75. Haplothrips gowdeyi Hood.

In Bidens blossoms, Ft. Myers, March, 1922. Hitherto known only from the West Indies.

76. Haplothrips humilis Hood.

On compositae. Ft. Myers, March, 1921. Another southern species not hitherto found in the United States.

77. Haplothrips merrilli Watson.

This species, described from specimens taken from cocoanuts from Cuba, (Fla. Entomologist, Vol. IV, No. 1), was found by the writer under the cap scales of cocoanuts at Ft. Myers, March, 1922.

78. Idolothrips tuberculatus Hood.

A male of this species was beaten from basswood *(Tilia americana)* at Gainesville, April 14, 1922.

(Mr. H. L. Dozier has specimens of Idolothrips armatus collected at Prairie, Miss., June 17, 1921, and Batesburg, S. C. It is quite probable that this species also occurs in Florida.)

79. Zygothrips floridensis n. sp.

Color: Light yellowish brown with much purple hypodermal pigment.

Measurements: Total body length 1.2 mm.; head, length 0.20, width 0.15 mm.; prothorax, length 0.11, width 0.21 mm.; metathorax, width 0.24 mm.; abdomen, width 0.21 mm.; tube, length 0.10, width at base 0.06,

at apex 0.027 mm. Antennae: Segment 1, 24; 2, 44; 3, 67; 4, 56; 5, 46; 6, 40; 7, 44; 8, 27 microns; total length 0.36 mm.

Head: 1.3 longer than wide, vertex rounded, striate towards the posterior margin; frons elevated; head widest just above the base; cheeks slightly convex, bearing a few short hairs; postocular bristles short, reaching but little past the posterior margins of the eyes. *Eyes* rather large, slightly protruding; red by reflected light, black by transmitted; non-pilose; facets large. *Ocelli* large, yellow, bordered with dark crescents; situated on the elevated frons, the anterior directed forward, the posterior pair widely separated, opposite the anterior third of the eyes from whose margins they are well separated. *Mouth-cone* short, reaching about half way across the prosternum; rounded at the tip. *Antennae* 1.8 times as long as the head; dark brown except most of segment 3, basal half of 4, and the extreme base of 5 which are a lighter, yellowish brown, segment 3 long and narrow. All bristles very small. Sense cones somewhat larger but colorless and inconspicuous.

Prothorax little more than half the length of the head, nearly twice as wide as long; trapezoidal; a prominent bristle on each posterior angle. These bristles have pale, dilated tips, all others are sharp pointed.

Pterothorax with sides nearly parallel; upper surface striated. Wings moderately long; membrane quite markedly constricted above the middle, colorless except for a trace of brown at the extreme base of the primaries, fringed with comparatively few and short hairs, four interlocated ones on the primaries. Legs rather long and slender, concolorous with the body except the fore tibiae which are paler, fore femora not swollen, no spines on the basal segments of the tarsi; hind tibiae each with a very thick, heavy bristle near the end.

Abdomen rather long and slender, anterior segments with three or four prominent bristles on each side, the median one or two sigmoid; on the posterior segments these become curved but not sigmoid; a pair on the ninth segment considerably longer than the tube. Tube rather wide for its length; terminal bristles much longer than the tube. Male not seen. Described from a single female taken by Mr. Geo. B. Merrill from an unknown shrub collected at Elfers by Mr. C. P. Sheffield, March, 1922. Type in the author's collection.

80. Hindsiana cocois Watson.

This insect was recently (Fla. Entomologist, Vol. V, No. 4, April, 1922) described from specimens collected from cocoanuts from Cuba taken from quarantine at Key West. Mr. Mosnette has sent us five larvae taken from under scales of cocoanuts at Miami, and Mr. George B. Merrill has collected a half dozen specimens from a mango from Oneco, Fla. As in the case of the other specimens, they were associated with scale insects. The insect is probably predaceous.

81. Cryptothrips laureli Mason (Ent. News Vol. XXXIII, No. 7).

The Bay Thrips. On all species of the genus *Tamala* in Central Florida from Frost Proof to Daytona. It probably occurs throughout Northern Florida but seems to be absent from the bays on the lower East Coast. Closely related to the Camphor thrips with which it was long confused.

36. Symphothrips punctatus Hood and Williams.

Oneco, Fla., July, 1922, on mango infested with scales and Septobasidium, George B. Merrill, Coll. This species has been taken at Key West from under the cap scales of cocoanuts from Cuba. Originally described from Orlando.

82. Hoplandrothrips funnebris Hood.

"Fla." Hood '17, P. 63.

83. Hindsiana cocois Watson.

Orginally described from Cuba (Fla. Entomologst, Vol. 5, No. 4, April, 1922, P. 66). Collected from mango, Oneco, Fla., by Mr. Jno. W. Collins.

THE GREENHOUSE THRIPS OUT-OF-DOORS IN NORTH-EASTERN GEORGIA

In August and early September the editor spent a fifteen days' vacation in Rabun County, Georgia, mostly collecting thrips. The most surprising capture was that of *Heliothrips haemorrhoidalis*, the green house thrips, from a wild shrub growing along a stream near Clayton. With the exception of the southern end of Florida (about Miami) this insect, in the United States, has never before been taken outside of greenhouses or in the immediate vicinity of greenhouses during the summer. But there are no greenhouses within many miles of Clayton and no houses very near the place of capture. The place and circumstances of its capture leave no doubt that it is living out of doors there the year around and point strongly to it being a native of the region.

Rabun county is in the northeastern corner of Georgia and this thrips was collected within seven miles of the North Carolina line and at an altitude of about 2000 feet. The vegetation and doubtless the climate of Rabun county is comparable to that of Southern Ohio. If this thrips can live out of doors in Rabun county, Georgia, it should, as far as cold is concerned, be able to do so over a large portion of the United States.

It is, of course, more common in the tropics, and it is supposed to have been introduced into northern greenhouses on plants brought from the tropics. Evidently its native range extends much further north than we have hitherto suspected and, perhaps, instead of being imported from the tropics, it originally entered the greenhouses from some local wild host.

The
FLORIDA ENTOMOLOGIST
Official Organ of The Florida Entomological Society, Gainesville, Florida.

J. R. WATSON.....*Editor*
WILMON NEWELL.....*Associate Editor*
A. H. BEYER.....*Business Manager*

Issued once every three months. Free to all members of the Society.

Subscription price to non-members is $1.00 per year in advance; 35 cents per copy.

ENTOMOLOGY AT THE AGENTS' MEETING

The eleventh annual conference of the county demonstration agents was held at the University from September 7 to 14. There were four scheduled talks on entomological subjects and much discussion during committee meetings, laboratory and informal conferences.

Mr. W. W. Yothers outlined the life history of the rust mite. At least 90% of them complete their life cycle, from egg to egg in nine days. Exposure to sulphur kills them in fifteen seconds.

A very live topic was that of dusting citrus trees for the control of rust mite. Mr. DeBusk spoke of the results of some dusting done in his county in cooperation with the Experiment Station. The control on the dusted plots was as good as on the sprayed plots and the cost was only about one fourth that of spraying. Mr. Kime thought it might be necessary to dust two or three times to secure as good a control as with spraying. Other agents spoke of the satisfactory results of dusting in their counties. Of even more importance than the cheapness of dusting as compared with spraying is the rapidity of the operation. In large groves, even tho spraying may be started at the first sign of danger, much damage may be done before the entire grove can be covered. Another point which might have been mentioned is that of safety. Much fruit was burned last year as a result of spraying during hot weather. Mr. Yothers reported as good results from the use of straight flowers of sulphur as with the mixture of sulphur and lime.

Mr. Yothers spoke of the work done at his laboratory on the entomogenous fungi by Dr. Spear. He came to the conclusion that the Red Aschersonia was spread mostly by the whitefly crawlers. This points strongly to the conclusion that the best

time to apply the fungus is when the maximum number of crawlers are out, i. e. about a week after the culmination of the June flight of adults. The yellow aschersonia, however, should accordingly, be applied about the middle of July. The same principle applies to the scale-infesting fungi. They should be sprayed on the trees when the maximum number of scale crawlers are out.

Mr. A. C. Brown spoke on sweet-potato certification.

The committee on truck crops reported the control of aphids to be one of their most serious problems.

RELATION OF ENVIRONMENTAL FACTORS TO WING DEVELOPMENT IN APHIDS[1]

By ARTHUR C. MASON

The generally accepted theory of most entomologists and experimenters on the subject is that winged forms of aphids are produced only when the continued existence of the apterous forms, under conditions then existing, might prove disastrous to the species. This occurs always in the fall in cold climates when sexual forms are produced, the males of which are usually winged, and also at any migrating season in the case of those species which live on two or more different host plants. There are also many other causes attributed to these adaptive variations. Among the factors which may be potent in acting as effective stimuli for wing formation are crowding on the host and hence lessening of the food supply, unusually high or low humidity, early lowering of temperature in autumn, changing constitution of the sap of the plants by chemical means, etc.

In collecting aphids it was noted that usually both winged and apterous forms occurred in the same colony; also, in the life history work with *Myzus persicae*, that some of them would be winged and others apterous. In several cases plant lice which were apterous when collected would develop wings when kept in the laboratory for a day or two. The question often arose as to why some of these forms were winged and some apterous when living under the same conditions, and as to whether the environment of the aphids in the breeding jars had an effect on this. Hence a series of experiments was planned to prove or disprove some of these theories.

[1]A synopsis of Part III of thesis entitled "Systematic and Biological Studies of Some Florida Aphididae", presented by the writer in 1915 to the University of Florida for the degree of Master of Science. This is the third and concluding paper of the series.

Species Used. For carrying on these experiments the following three species of aphids were mostly used: *Lachnus pini* L., *Myzus persicae* Sulz., and *Aphis gossypii* Glov. These aphids could be found in greater or less abundance at all times of the year and both winged and apterous forms occurred naturally in the colonies. They continued to reproduce viviparously all through the winter and hence a supply of adults could always be obtained. The last two species lived on a number of different host plants and so could be raised under varying conditions. Another species, *Macrosiphum davisi,* had been observed for a year on the rose bushes and no winged forms ever occurred. Hence some work was done to try to produce some individuals with wings.

EFFECT OF INJURY TO HOST PLANTS

Starting out with what appeared to be the most promising methods of securing results, some experiments were run to determine the effect of injury of the host plant on the aphids. For this work some small pine trees infested with *Lachnus pini* were selected. The object was to injure the branches by girdling or partial girdling so as to shut off the flow of sap in the branch and determine the effect on the aphids.

Branch A was injured by cutting the bark and cambium layer for one-third of the distance around it; branch B had the bark cut through the cambium layer for two-thirds of the distance around; branch C was a check, uninjured. On each of these branches was placed a small colony of *Lachnus pini* in a cage. Another small tree was completely girdled around the base and a colony placed on it in a manner similar to the others. This colony is designated as D. A third tree was uninjured and a colony placed on it for a check, designated as E. These experiments were begun in November and were run for about two months, the results being recorded two or three times a week. The number of winged forms found each time were counted and the results tabulated.[2] The table shows that winged forms were produced in all the cages. On the first tree check colony C had approximately as many winged forms as colonies A and B which were on injured branches. Colony D also had a large number of winged forms but check colony E for a few weeks produced only apterous forms. Later on, however, winged ones appeared.

[2]The tables are necessarily omitted because of lack of space and instead the results are summarized. The photographs illustrating the work are also excluded.

A little later the experiment was repeated. Colony F was placed on another uninjured tree and colony G on a small tree which was girdled in a manner similar to the tree in the previous experiment. Colonies H and I were checks on uninjured branches of another tree. These were carried on as the previous experiments for several weeks with no decided results on wing production by injuring the host plant. The checks produced winged aphids about as consistently as did the injured limbs. Check colony E appeared for a time to be an exception to this rule, and it was thought that the tree on which they were living might be the cause of this. Consequently some of the apterous aphids from colony E were taken out and three new colonies started from them. Colony J was placed on a branch near A and B on tree No. 1, which had produced winged forms; colony K was placed on a limb of the girdled tree No. 4 by the side of colony D which had also produced winged forms; and colony L was moved to a new limb of tree No. 5, near colony E, for a check and to counteract any effect of moving the aphids to other trees. As the results show, winged aphids were produced not only in each of these three colonies, but also a little later in the original colony E.

About two months after being girdled one of the trees was turning very yellow from the effects. Therefore, two colonies of aphids were placed in cages on limbs of this tree, and two other colonies were placed on limbs of a healthy tree, as a check. All four colonies were taken from the same colony containing both winged and apterous forms. Here, also, during two months' time, winged forms were found in the checks in about the same ratio as in the colonies on the girdled tree. Therefore, the unhealthy condition of a pine tree due to girdling or any change which it may cause in the sap of the tree will not cause the aphids on it to produce wings in increased numbers over those on healthy trees.

Effect of Crowding on Wing Production. In many colonies it was observed that no winged forms appeared until several days after the colony was started, or until it had increased in size and often covered the limb thickly. Consequently the question arose as to whether or not the large number of aphids there caused the production of wings, either directly, or indirectly, by lessening the food supply. To investigate this point two colonies were started on a girdled tree. The first one, colony M, was placed on a limb of this tree on December 11 and allowed to

grow. A week later another small colony, (N), taken from the same place as the others, was placed on another limb. Colony M had a start on colony N and should be more numerous and show any effects of crowding sooner than N. The results show no difference. In fact colony M produced winged forms before N was even started and while there were only a few aphids there, and continued to produce them as long as the colony lived there. Therefore crowding as a probable cause of wing production was given up.

Effect on Myzus persicae of Injuring Cabbage Plants. This experiment was tried in the greenhouse insectary and its object was to see if unfavorable conditions of growth for a cabbage plant will cause aphids of the species *Myzus persicae* growing on it to produce wings and seek a new plant. Twelve potted cabbage plants were placed on the bench and covered with lantern globes, and divided into three groups. The first four had a cord tied lightly around the stem which would shut off the flow of sap to some extent. The next four were given no water and allowed to dry up. The third four were kept in a normal condition and used as checks. Each of the plants had a number of aphids placed on it and left for two weeks, the results being recorded each day or two. As the table shows, winged forms were produced on all of the plants without discrimination. In fact the total number on the four plants of each group is about the same. The results, therefore, do not argue in favor of the unhealthy condition of plants causing wings.

Mature Aphids. Eight adult apterous *Lachnus pini*, which had already produced some young, were placed on a cut stem which had already become partially dried out. All died in less than a week and produced no wings. It is hardly reasonable to believe that an adult could develop wings.

EFFECT ON APHIDS OF ADDING CHEMICAL SOLUTIONS TO THE FOOD OF THE HOST

Some experiments were next run to determine if changing the sap of the host plant by adding chemical solutions to its food would cause aphids on it to produce wings in order to seek a new host. Some of these chemicals would undoubtedly be taken up by the plant and consequently added to the dietary of the aphids. First, some cabbage plants which were infested with *Myzus persicae* were watered with solutions of magnesium sulphate of varying strengths. Small pots were filled with clean

white sand and some small cabbage plants, whose roots had been washed clean of all earth, were placed in them. The object was to remove all plant food, as far as possible, and give the plants nothing but what was in the solutions added. The plants were placed under lantern globes in the laboratory and divided into four groups of two plants each. One lot was watered with a 1% solution, one with a 5% solution and one with a 10% solution of magnesium sulphate, and the other with distilled water for a check. The sand was kept moist by watering every day and the results recorded daily. The 5% and 10% solutions were found to be too strong and the plants soon died. Some winged forms were found on all but two of the plants however.

The experiment was then repeated, this time using three per cent solutions which would not affect the plants so quickly. Eight cabbage plants were cleaned and potted as before and divided into four groups. One group was watered with a 3% solution of each of the following: magnesium sulphate, sodium chloride, tannic acid, and one group with distilled water for a check. In no case did the plants live more than a few days. They soon began to turn yellow, probably from lack of food, and consequently the aphids left them and started wandering around and died. As the table shows, wings were produced in some of them, but without much consistency. Although the checks produced no winged forms, one plant in each of the other groups showed none also. The experiment did not run over a long enough period to be conclusive. There was not sufficient time for the aphids to mature and show the effects of the chemicals. Besides we cannot prove that the plants took up any of the chemical solutions added, since the roots have the power of discriminating between the available foods. Therefore some attempts were made to rear them on cut stems in chemical solutions.

Experiments with Cut Stems. Eight young orange tips were cut from a tree and placed in small pots of clean white sand which were covered with lantern globes and set in the greenhouse on a shaded bench. On each of these cuttings were placed a number of aphids of the species *Aphis gossypii.* Two of them were watered with a 3% solution of each of the following chemicals: magnesium sulphate, sodium chloride and citric acid; and two were watered with distilled water for checks. The results were recorded as long as the cuttings kept fresh and the aphids

lived on them. However after a few days the leaves wilted and dropped and the aphids began to die. Some winged ones were produced on all but one of the cuttings, but with no regularity.

A little later the experiment was repeated, this time with *Myzus persicae* on orange cuttings. The cuttings were prepared as described above. Three or four dozen aphids were placed on each and watered with the same solutions as above and in the same order. The results as recorded show that wings were found in all but one, a cutting watered with sodium chloride solution. This cutting did not last very long before the leaves turned brown and dropped. In fact the cuttings watered with the chemical solutions showed the effects sooner than the checks in all cases. In this experiment the checks produced more winged specimens than any of the others except those watered with magnesium sulphate which produced about an equal number. Possibly this can be explained by the fact that the cutting did not wilt so quickly and hence more of the aphids had an opportunity to mature. At any rate, the wilting of the stems or the effect of the chemicals cannot be said to produce wings.

Lachnus pini on Pine Cuttings. Four branches were cut from a pine tree and placed in bottles one each containing a 3% solution of magnesium sulphate, sodium chloride and citric acid and distilled water. On each of these branches were placed about four dozen immature aphids of *Lachnus pini* which were allowed to mature. The mouths of the bottles were plugged with cotton and the whole bottle and stem covered over with a bell jar. Results show that in all cases except the check a majority of the aphids died while still immature and in the check also a large number died before becoming adult. The greatest mortality was noted on the stems kept in sodium chloride and citric acid. The leaves soon began to dry up there and the aphids died. In all cases however some winged ones were produced but most in the check. Here also we can say this is due to the fact that more of the aphids lived to become adult on the check.

Injections of Chemicals into Plants. To make more sure of getting the chemicals into the sap of the plant and thus adding them to the food of the aphids, they were injected into the growing stems with a hypodermic needle. This method was used on both cabbage plants and orange trees. Eight growing healthy cabbage plants were potted and placed under lantern globes in the open-air insectary. The same chemicals as used above were

injected into the stems. In two each was injected magnesium sulphate, sodium chloride and citric acid, in one distilled water and in one nothing. On each of these plants were placed twelve immature specimens of *Myzus persicae* about one week old. The plants were watered and kept in a healthy condition, and the aphids were allowed to mature there. The results show a few winged ones for each of the solutions, but not conclusive in favor of the chemicals. On one plant of each group all matured apterous.

The same experiment was later tried by injecting some of each of these chemicals into young orange tips and tying up in each twelve immature *Myzus persicae*. Chemicals in same order as above. Here, also some winged ones were produced in each case, but most in the checks.

Trials with Rose Aphids. A species of green rose aphid, probably *Macrosiphum davisi,* had been watched for over a year on rose bushes and no winged specimens were ever seen. Therefore an attempt was made to produce wings on some of them. Three cuttings of rose were made and placed in sand and watered: No. 1 with 1% magnesium sulphate, No. 2 with 5% magnesium sulphate, and No. 3 with water. On each cutting was placed several of the rose aphids. The rose cuttings however only remained fresh for a few days, when they wilted and the leaves fell. The aphids died and no wings were produced. The experiment was repeated a little later, this time by changing the cuttings about every three days and transferring the aphids to the fresh cuttings. In this way three generations were raised and about thirty individuals in each. All were apterous. No winged forms were produced not even in the second and third generations.

Effect of Chemicals on Plants. In all cases where cut stems were placed in chemical solutions it was observed that the checks in distilled water would last longer. A number of tests with cuttings used in solutions of varying strength of the above chemicals showed this always to be the case. The chemical solutions caused wilting the second day and dropping of the leaves in two or three days. The checks stayed fresh for five days. In all these cases the results were conclusive enough to show that the chemical solutions do have a deleterious effect on the cut plants, and plant physiologists agree on this point. Where the solution is strong enough it will have an osmotic pressure, which will

draw the sap from the cutting and consequently cause it to turn brown and wither. The fact that the checks always lasted longer, and therefore the aphids lived longer, is sufficient cause for the greater number of winged forms there. The experiment failed, however, to show that the chemicals in the stems will cause the aphids to produce wings, since the checks always produced as large a number of winged forms.

(To be continued)

Printing for All Purposes

Carefully Executed
Delivered on Time

Pepper Printing Company

Gainesville, Florida

Now is the time to spray trees affected with rust mite, scab or melanose. We handle the

DRY LIME SULPHUR

It saves freight on water and expense of handling. Shipped in air-tight packages with removable top. Will keep indefinitely if top is replaced after using. Dissolves readily in any water. Add Dry Lime Sulphur to water and stir. Five pounds to one hundred gallons water for rust mite, equivalent to two gallons 33° Lime Sulphur Solution to one hundred gallons of water. Prices range from 10½ to 25c per pound according to quantity order.

Arsenate of Lead
Bluestone
Bordeaux Mixture
Genuine Protexol
Caustic Soda
Schnarr's Spray Formula
Carbolic Acid, Crude
Copperas
Fish Oil Soap
Soluble [illegible] Compound
etc.
[illegible]ite Fly De-

Fresh stock of g[illegible]

IN OUR SPRAY

we carry only the best and [illegible] such as Leggett's Champion Duster, Lowell [illegible] Compressed Air Sprayers and Gould Sprayers. Write for [illegible] prices.

E. O. PAINTER FERTILIZER [illegible], Jacksonville, Fla.

When writing to advertisers mention The Florida Entomologist